REMARKS

Initially, the apparent withdrawal of the § 102 rejection of claims 6, 10 and 31 based on Bowman '283 is gratefully acknowledged. Applicants have carefully studied the Office Action of August 14, 2008 and offer the following remarks in response thereto.

Objection to the Specification

Claims 6, 10, 31 and 41-42 presently stand objected to under 35 U.S.C. 132(a) because the amendment filed on May 13, 2008 allegedly introduces new matter into the disclosure. Specifically, the Examiner objects to the following added material: "a constant direct current continuously supplied at a fixed level" (claims 6, 10 and 41) or "at a predefine[d] level" (claims 31 and 42). This rejection is respectfully traversed.

First, claims 41 and 42 have been amended and no longer refer to a "fixed level" or "predefined level" in connection with a constant direct current. Therefore, it is respectfully submitted that the objection is now moot with respect to these two claims. The other claims (6, 10 and 31) are addressed below.

The Specification discloses and describes a "constant current mode" whereby a "desired electrical current" or a "constant current of predetermined value" is supplied to the LEDs in an array. *See, e.g.,* paragraphs [0021], [0042]. The predetermined or desired level of current may be selected, for example, by a dimmer or brightness control. The current is thereafter "maintained" or "controlled"

at that "constant" level, subject to certain operating conditions such as adequate battery voltage. *See, e.g.*, paragraph [0039].

Turning specifically to claims 6 and 10, it is respectfully submitted that these claims are fully supported by the Specification as originally filed. Claim 6 includes, among other things, "a constant direct current" that is "continuously supplied at a fixed level to said at least one light emitting diode as said battery discharges ...." Similarly, claim 10 recites "said first output provides a constant current output at a fixed level to said light emitting diode regardless of voltage fluctuations...." This subject matter is described, for example, in the Summary of the Invention at Paragraph [0021]:

> [0021] The current flowing through the entire array may be controlled by a MOSFET, or other solid-state switch, such that the brightness of the array can be controlled. Alternatively, the DC-DC converter may be ***operated in a constant current mode such that a desired electrical current is driven through each series combination of LED lamps***. The brightness can be controlled by setting the total current produced by the power supply while operating the lamps in a true flicker-free fashion.

Similar subject matter is described in connection with specific circuit embodiments in the Detailed Description of the Specification, for example at Paragraph [0039]:

[0039] By way of example and not limitation, in one preferred embodiment, the voltage across each LED lamp is approximately 2.7 volts, at 20 milliamps of LED current, and the current flowing through each LED is controlled over a range from about zero milliamps through about 20 milliamps. The total current consumed by the array is measured through current sense resistor 216 and sense amplifier 218. In a preferred embodiment ***controller 220 maintains a constant adjustable current flowing*** through resistor 216, so long as the voltage at 214 does not exceed a predetermined maximum value, the value being roughly equal to the operating voltage of an LED at maximum current times the number of LED lamps in each series combination. Thus, for example, assuming 20 milliamps per series combination and 20 combinations at full brightness ***the current would be controlled at 400 milliamps***. To dim the LED's ***the current is simply maintained at some value*** between zero and 400 milliamps. ....

The above passage from the Specification explains that the inventive power supply circuitry can be operated so as to "maintain" the LED current at "some value" such as 400 mA. While the words "at a fixed level" are not used in exactly those terms, that is what the Specification describes in substance – and the example provided ("at 400 milliamps") constitutes a "fixed level."

Similarly, in Paragraph [0042] the Specification provides additional support for the subject matter of claims 6 and 10:

[0042] Ideally, a constant current source would be employed for each series combination of LED lamps. While this technique would ensure equal current flows in each series combination, unfortunately it would also consume a great deal of board space and substantially raise the cost of the board. However, a constant current ballasting circuit 400 could be used to ensure the proper current flows through each string of lamps. Circuit 400 could be reduced to a two terminal device, i.e. terminals 402 and 420, which is simply wired in series with a string of resistors to provide a variable voltage drop to control the current flowing therethrough at a predetermined level. Thus ***the same constant current of a predetermined value will flow through every LED in an array***, even if some series-wired groups have more, or less, LED lamps than others within the array. As will be appreciated by those skilled in the art, circuit 400 could easily be housed in an industry standard 1206 surface mount package and consume only minimal board space.

Thus, the Specification clearly supports claims to a constant direct current that is continuously supplied "at a fixed level" to one or more LEDs "as said battery discharges" (claim 6) or "regardless of voltage fluctuations" (claim 10). It is therefore respectfully requested that the objection to claims 6 and 10 be withdrawn.

Claim 31 as previously presented referred to a "continuous current output" at a "predefined level regardless of voltage fluctuations across said light emitting

diodes...." Thus, the same passages from the Specification supporting the language in claims 6 and 10 also support claim 31. Moreover, claim 31 has been amended so that instead of using the term "predefined level" they now use the term "predetermined level" which parallels more precisely the language used in the Specification at paragraph [0042] ("Thus the same ***constant current of a predetermined value*** will flow through every LED in an array, even if some series-wired groups have more, or less, LED lamps than others within the array.") Accordingly, it is respectfully submitted that claim 31 is supported by the Specification as originally filed, and Applicants request that the objection to claim 31 be withdrawn.

First § 102 Rejection

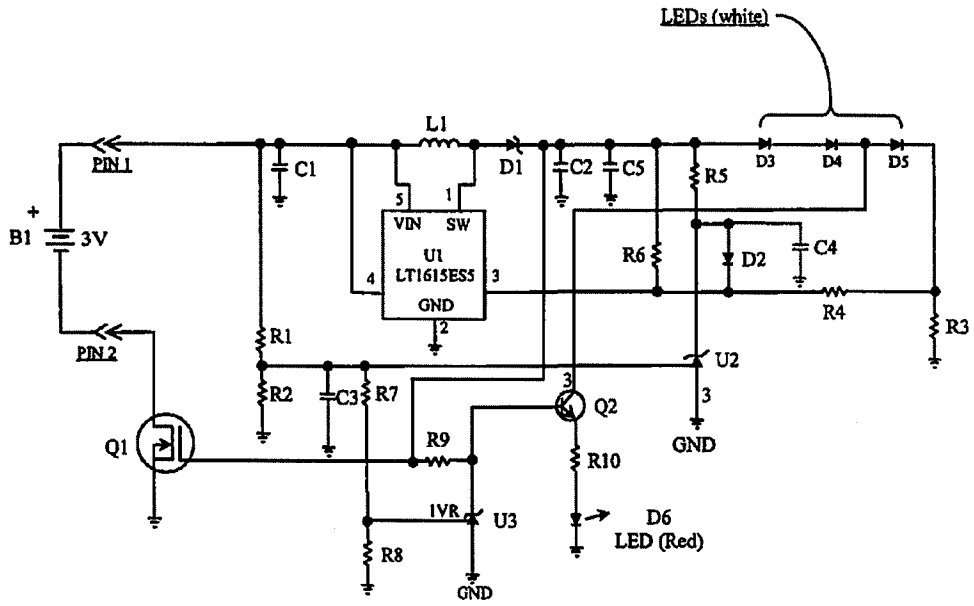
Claim 1 presently stand rejected under 35 U.S.C. §102(e) as allegedly anticipated by U.S. Patent 6,791,283 (Bowman et al). This rejection is respectfully traversed.

Claim 1 pertains to a battery operated LED lighting apparatus comprising, among other things, a "power supply including a boost regulating circuit," a "constant voltage" being "continuously supplied" to at least one LED, wherein the power supply "maintains the constant voltage by monitoring voltage across the at least one LED."

Bowman '283 discloses a circuit for an LED-based flashlight which operates in a distinctly different way from the device claim 1. Bowman's device operates in two modes. In the first mode, the battery output voltage is allowed to decay. In the

second mode, which only occurs when the battery voltage has decayed significantly, the battery output voltage is held at a fixed level (e.g., 1.8 volts for a 3-volt battery; see col. 5, lines 64 – col. 6, line 3). In neither mode, however, does Bowman '283 "maintain[] the constant voltage ***by monitoring voltage across the at least one LED***." Rather, Bowman '283 monitors the local ***battery voltage*** to maintain the battery voltage output level, ***regardless of*** the voltage level ***across the LED(s)***. (See Bowman, Fig. 2, "Battery Voltage Feedback")

Nonetheless, the Office Action states that Bowman '283 does disclose the subject matter of claim 1 "by sensing the current of [the] LEDs" and cites to col. 3, lines 25-65 and col. 4, lines 20-60. (Office Action, ¶ 1) However, sensing the current of the LED(s) is not the same as monitoring the voltage across the LED(s) and, in any event, the monitored current in Bowman '283 is not used to "maintain[] the constant voltage" as required by claim 1. Rather, Bowman '283 explicitly shows in Fig. 2 the "Battery Voltage Feedback" coming from the Battery Voltage Sensing Block ***connected to the battery B1***, not the LED(s). In connection with the more detailed diagram of Fig. 1, Bowman '283 explains that it uses a voltage divider involving R1, R7 and R8 "to provide a voltage proportional to the battery voltage to input pin 1 of U2." (Col. 6, lines 6-8) This statement also clearly reflects the fact that the voltage of the battery B1 is being directly sensed, not the LED output, as can be seen by the connection of resistor R1 to the battery terminal in Bowman's Fig. 1:



When the battery voltage drops below 1.8 Volts, Bowman's operation is described as follows:

> "When the battery voltage falls below 1.80 volts, the input to U2 will fall below 1.24 Volts; this will cause U2 output to rise, pulled up by R5; this will forward bias diode D2. Current flow through D2 will cause a voltage drop across R4; voltage at R3 will drop as U1 continues to regulate its feedback voltage to 1.23 Volts, thus the LED current will decrease." (Col. 6, lines 13-19)

Thus at no point is Bowman's circuit described as using a monitored voltage across the LED(s) in order to regulate a constant output voltage. Rather, Bowman monitors the actual battery voltage and uses that reading to change modes. When the mode changes to a constant voltage output mode, the mode is maintained by

using the same direct battery voltage sensing, i.e., the resistor divider of R1, R7 and R8. The only reason for monitoring the LED current after the mode changes is to "force a reduction in LED current to whatever extent is required to prevent the battery voltage from decreasing below 1.80 Volts." (Col. 6, lines 19-21) However, this does not necessarily maintain the voltage across the LEDs constant.

Also, it is further noted that monitoring the battery voltage is not the same or equivalent to monitoring the voltage across the LEDs. Bowman's battery output (connected to resistor R1) is separated from the LED voltage by an inductor L1 and a diode D1. Because the inductor L1 is being switched, the voltage across the inductor L1 will vary over time, and the LED voltage will not necessarily correlate to the battery voltage. Therefore, Bowman's voltage monitoring technique is quite different from the invention of claim 1.

Accordingly, it is respectfully submitted that claim 1 should be allowed over Bowman '283.

Second § 102 Rejection

Claims 6, 10-13, and 31 stand rejected under 35 U.S.C. §102 (b) as allegedly anticipated by U.S. Patent 6,150,802 (Andrews). Without acquiescence in the grounds of the rejection, and without prejudice to pursue the original claimed subject matter at a later time by continuation application or otherwise, Applicants have amended independent claims 6, 10 and 31 to clarify the subject matter being claimed. This rejection is respectfully traversed.

1. The Independent Claims (6, 10 and 31)

Each of independent claims 6, 10, and 31 includes various features that patentably distinguish them from Andrews '802.

a. Claim 6

Claim 6 pertains to a battery-operated LED lighting apparatus comprising, among other things, a power supply "including a boost regulating circuit, said power supply in communication with said battery to produce an output voltage to said at least one light emitting diode such that a constant direct current is continuously supplied at a fixed level to said at least one light emitting diode as said battery discharges regardless of voltage fluctuations across said at least one light emitting diode, wherein over at least a portion of said discharge cycle said output voltage is higher than said battery voltage, and wherein the power supply maintains the constant direct current by sensing electrical current directed through the at least one LED." Claim 6 has further has been amended to include: "a voltage sensor for monitoring a voltage across the at least one LED; wherein the boost regulating circuit further uses the monitored voltage to maintain a consistent voltage level to the at least one LED."

While Andrews '802 discusses "DC to DC switcher to supply a constant current" (col. 2, lines 13-14), it does not disclose a device that provides both a "constant direct current ... at a fixed level" by way of a feedback current sensor, as well as a "voltage sensor for monitoring a voltage across the at least one LED; wherein the boost regulating circuit further uses the monitored voltage to maintain a consistent voltage level to the at least one LED." In other words, claim 6 describes

a battery-operated LED lighting apparatus using voltage and current feedback to maintain both voltage and current at constant levels. By contrast, Andrews '802 teaches that "[w]hen a constant current is desired, constant current power supplies produce the constant current by allowing the voltage to vary as the demands of the load change." (Col. 3, lines 54-57) This can be seen from the embodiment of Figure 6 in Andrews '802 (the only embodiment which shows any details of the DC to DC switcher). As shown in Figure 6, the switching integrated circuit 680 relies entirely on current feedback signal 606 for maintaining a constant current, and makes no provision for monitoring the output voltage or using voltage feedback to maintain a constant voltage:

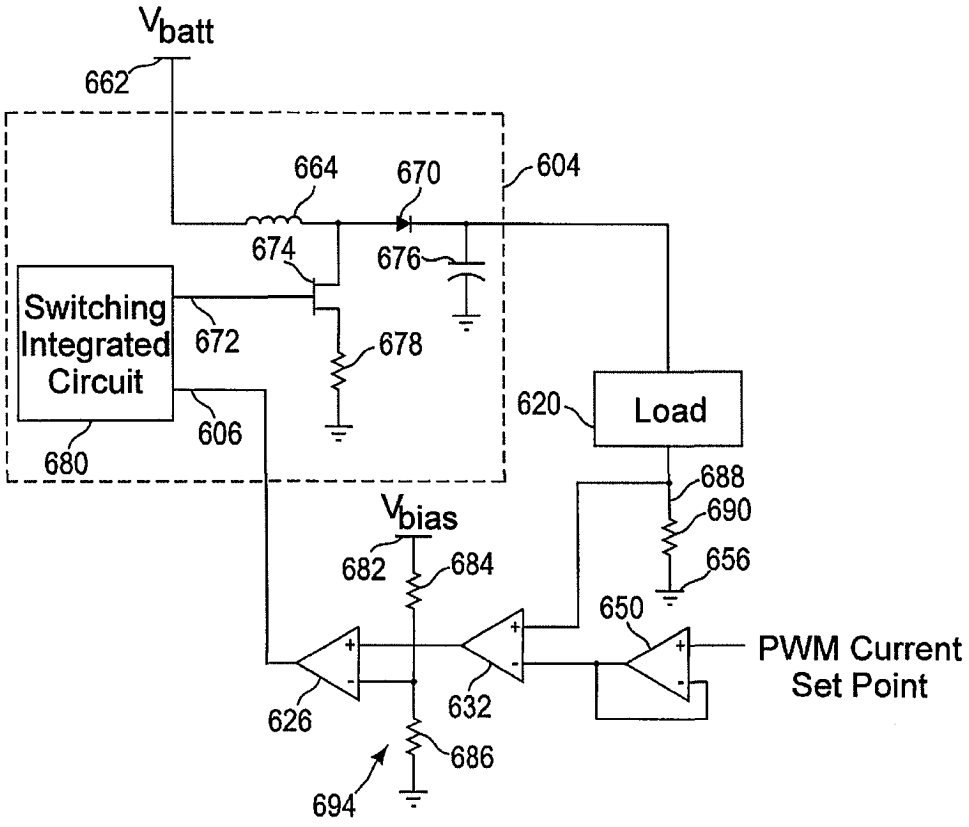


FIG. 6

While the details of the other embodiments of Andrews '802 are not illustrated, it can be assumed that they operate in the same way. Accordingly, it is respectfully submitted that Andrews '802 neither discloses nor suggests the subject matter of claim 6, as amended. Additionally, by focusing solely on constant current and allowing the voltage to fluctuate, Andrews '802 in fact ***teaches away*** from the subject matter of claim 6, and would not render it obvious. Claim 6 should thus be allowable over Andrews '802.

b. Claims 10 and 31

Claim 10, as amended, pertains to an LED lighting apparatus having "a light emitting diode for providing a continuous source of primary illumination for a subject in film, video, or digital imaging;" and a "switch-mode regulator circuit" having "an input," "a first output ... in communication with said light emitting diode," and "a current feedback path and a separate voltage feedback path in communication with said output such that when said input receives a first voltage, said first output provides a constant current output at a fixed level to said light emitting diode while maintaining the output voltage substantially constant across said light emitting diode despite fluctuations in said first voltage."

Without acquiescence in the grounds of rejection, and without prejudice to pursue at a later time by continuation application or otherwise, claim 10 has been amended to include mention of a "separate voltage feedback path" whereby the power supply "maintain[s] the output voltage substantially constant across said diode despite fluctuations in said first voltage" from the battery source. As noted above with respect to claim 6, Andrews '802 actually allows the voltage to fluctuate

while keeping the current constant, leading to a different type of operation. It is respectfully submitted that Andrews '802 fails to disclose or suggest all of the subject matter of claim 10 including a "separate voltage feedback path" or a power supply that "maintain[s] the output voltage substantially constant across said diode despite fluctuations in said first voltage" from the battery source, as set forth in claim 10, and that claim 10 should thus be allowable.

Claim 31, as amended, relates to a battery-powered lighting apparatus suitable to provide proper illumination for lighting of a subject in film, video, or digital imaging, comprising a "plurality of light emitting diodes for illuminating a subject to be filmed or imaged," and "a switch-mode regulator circuit configured to receive a first input voltage derived from a battery, and having a first output in communication with said light emitting diodes to provide a continuous current output to the light emitting diodes at a predetermined level, wherein said switch-mode regulator further includes a current feedback path to sense said first output and regulate said current output to maintain it at said predetermined level, and a separate voltage feedback path to sense the output voltage across said light emitting diodes and to regulate the output voltage at a substantially constant level across said light emitting diodes despite fluctuations in said first input voltage."

Again, for reasons explained with respect to claim 6, Andrews '802 does not provide a "separate voltage feedback path to sense the output voltage across the light emitting diodes" or "to regulate the output voltage at a substantially constant level across said light emitting diodes despite fluctuations in said first input voltage,"

and it is therefore respectfully submitted that claim 31 should be allowable over Andrews '802.

2. The Dependent Claims (11-13)

Claims 11-13 depend from claim 10, and should there be allowable as depending from an allowable base claim.

Further, the dependent claims are believed to contain novel and unique features rendering them independently patentable over the cited items. Given the substantial differences over Bowman '283 already discussed, no further discussion of claims 11-13 is deemed necessary at this point.

The § 103 Rejections

Claims 2-5 and 39 presently stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Bowman '283 in view of U.S. Patent 5,661,645 (Hochstein). Claims 7-9, 17-22, 25-30 and 32-40 presently stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Andrews '802 in view of Hochstein '645 and U.S. Patent 6,305,818 (Lebens et al.). These rejections are respectfully traversed.

First, all of the dependent claims 2-5, 7-9, 17-22, 25-30, and 32-40 depend from either claim 1, 6, 10 or 31, and should there be allowable as depending from an allowable base claim.

Further, the dependent claims are believed to contain novel and unique features rendering them independently patentable over the cited items. Given the

substantial differences over Bowman '283 and Anderson '802 already discussed, only a few illustrative examples are discussed below.

For example, claim 19 depends from claim 10, and recites that the first (input) voltage "comprises, or is derived from, an AC voltage." Claim 28 contains similar recitals. Andrews '802 discloses a battery input and does not appear to mention an "AC" input voltage at all. It is respectfully submitted that one of ordinary skill in the art would not consider modifying Bowman '283 to utilize "an AC voltage" as the first voltage, and that claims 19 and 28 are therefore allowable over the cited items.

Claim 33 depends indirectly from claim 31, and recites that the battery-powered lighting apparatus further comprises a "ballast element in series with each group [of light emitting diodes and] ... having a value such that a level of direct current drawn by each group is substantially identical." Claims 35 and 36, which originally depended from claim 33, have been rewritten in independent form. Claim 35 specifies that the ballasting element "comprises an inductor," and claim 36 recites that the ballasting element comprises a "transistor having a fixed operational current established at least in part by a zener diode." It is respectfully submitted that the particular combinations of circuitry recited in claims 35 and 36 is nowhere disclosed or suggested in the cited items, nor does the Office Action so specify.

Claim 41 depends from claim 1, and has been amended to recites that "when the battery output voltage reaches a predefined voltage level corresponding to a battery capacity percentage threshold level, the power supply automatically cuts off the current to the at least one light emitting diode." Claim 42 depends from claim 31

and contains similar recitals. It is respectfully submitted that the features of claims 41 and 42 are lacking in the cited art, and the Office Action does not identify any such features in the cited references.

The features of claims 41 and 42 mitigate the possibility of light fluctuations by cutting off the LED current when the battery output voltage (or first input voltage) is no longer sufficient to supply the constant current. In this way, if the lighting device is no longer able to supply the required light output, that fact will be immediately recognized and the battery can be swapped out for a new one or else a substitute fixture can be used, thus avoiding the possibility of a ruined motion picture or television shoot. It is respectfully submitted that this substantial benefit is not taught by any of the cited references, and that claims 41 and 42 should therefore be allowable thereover.

Reservation of Right to Challenge Cited Items

While Applicants have addressed the cited items on the merits, this should not be construed as an admission that they constitute prior art as against the claimed invention. Applicants reserve the right to antedate the cited items pursuant to the appropriate rules, laws, and regulations if deemed necessary to do so.

Likewise, Applicants' election to address the cited items on the merits should not be construed as an admission that they provide an enabling disclosure. Applicants reserve the right to challenge the sufficiency of the cited items at a later point in time, including in any post-issuance proceeding or suit, if appropriate.

Request for Allowance

The Examiner is kindly requested to enter the amendments presented herein. The undersigned has made a good faith effort to respond to all of the rejections in the case and to place the claims in condition for immediate allowance. Nevertheless, if any unresolved issue remains, the Examiner is invited to contact the undersigned by telephone to discuss those issues so that the Notice of Allowance can be mailed at the earliest possible date.

It is believed that the instant application is in condition for final allowance, and, accordingly, issuance of a Notice of Allowance is earnestly solicited.

Respectfully submitted,

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